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Coeur d'Alene

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY
FOREST INSECT INVESTIGATIONS

NINTH ANNUAL SURVEY OF THE INSECT
INFESTATIONS OF THE COEUR D'ALENE
NATIONAL FOREST
1937

By
T. T. Terrell
Scientific Aide

Summary and Recommendations
James C. Evenden
Sr. Entomologist

Forest Insect Laboratory
Coeur d'Alene, Idaho
March 9, 1938

BUREAU OF
Entomology and Plant Quarantine
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FOREST INSECT LABORATORY,
PORTLAND, OREGON

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WJB

Forest Insect Laboratory
Coeur d'Alene, Idaho
Mar. 9, 1938

Dr. F. C. Craighead
Washington
D. C.

Dear Dr. Craighead:

Enclosed are three copies of Mr. Terrell's report covering the ninth annual survey of the Coeur d'Alene National Forest, with my summary and recommendations.

In last fall's bark-beetle control operation on this forest unfavorable weather conditions made it necessary to close the operation in the Forks Cabin-Chly Creek unit at the head of Steamboat Creek prior to completing the work. As it is estimated that there are some 500 infested trees on 400 acres, this spot of severe infestation is considered as endangering adjacent timber stands and should be treated. I have therefore recommended that the sum of \$2500 be allotted for this purpose, and that a camp be reinstated as early in the spring of 1938 as possible for the purpose of treating these trees.

As this report carries a recommendation for the expenditure of public funds, it is being sent through your office for Bureau approval. One copy is intended for transmittal to the Forester and the other to the Regional Forester at Missoula.

Trusting that this report may have your approval, I remain

Respectfully yours,

James C. Evenden
Senior Entomologist

Enclosures

cc to:
Mr. Miller
Mr. Keen ✓
Mr. Beal

NINTH ANNUAL SURVEY OF THE INSECT
INFESTATIONS OF THE COEUR D'ALENE
NATIONAL FOREST
1937

A survey to determine the extent of the mountain pine beetle infestation in the white pine stands of the Coeur d'Alene National Forest was started August 2 and ended September 1, 1937. During the course of the survey 5,708 acres of sample strip were examined in 113,910 acres of white pine stands, which gave a 5 percent sample of the forest area. The survey was made by examining all white pine trees on strips one chain in width. Records were kept as to the number of insect-infested trees and the number of green white pine of 8 inches d.b.h. or over. These data were compiled and the results were applied to the total acreage of each unit. Data secured on the survey are presented in table I which shows the units into which the forest has been divided and the acreage in each.

The green stand per acre as found on the strips is given to show the stand variation. The percentage of stand killed represents the percent of stand killed during 1937. The units have been grouped into districts which represent the original ranger districts of the forest.

Table I

MOUNTAIN PINE BEETLE INFESTATION ON THE
COEUR D'ALENE FOREST 1937

Unit		: Acres	: Green stand	: Attacks per acre	: Percent of stand killed	: Infested trees
Little River District						
Forks	:	1,100	: 7.0	: .039+	: .55	: 43
Tom Lavin	:	3,000	: 7.0	: .020-	: .28	: 60
Iron Creek	:	4,120	: 12.7	: .041-	: .32	: 168
Cathcart	:	3,200	: 9.7	: .020-	: .21	: 64
Cascade	:	3,640	: 16.4	: .124+	: .75	: 451
Picnic	:	1,680	: 6.2	: .033-	: .53	: 55
Honeysuckle	:	5,320	: 19.4	: .177+	: .90	: 942
Leiberg	:	4,440	: 9.6	: .016+	: .16	: 71
Laverne	:	2,560	: 18.5	: .045-	: .24	: 115
Copper Creek	:	4,000	: 11.0	: .079+	: .71	: 316
	:		:	:	:	
Total	:	33,060	: 13.4	: .069	: .51	: 2,285
Grizzly Mountain District						
Taylors	:	2,800	: 11.0	: .272+	: 2.47	: 762
Forks-Cabin	:	5,440	: 34.1	: .234+	: .69	: 1,273
Can Creek	:	1,760	: 27.8	: .156+	: .56	: 275
West Fork	:	3,960	: 17.8	: .118+	: .66	: 467
Clay Creek	:	2,320	: 40.0	: .240+	: .60	: 557
Lower Cougar	:	3,600	: 24.6	: .100+	: .40	: 360
Upper Cougar	:	3,700	: 21.4	: .091+	: .42	: 337
Bumblebee	:	3,040	: 7.7	: .198+	: 2.50	: 602
	:		:	:	:	
Total	:	26,620	: 24.3	: .174	: .71	: 4,633
Shoshone District						
Sissons	:	4,700	: 24.6	: .221+	: .89	: 1,039
Yellow Dog River	:	2,140	: 22.0	: .587+	: 2.60	: 1,256
Yellow Dog Creek	:	4,120	: 35.3	: .166+	: .47	: 654
Downey Creek	:	4,160	: 41.4	: .391+	: .93	: 1,627
N. Yellow Dog	:	840	: 34.0	: .112+	: .33	: 94
Lower Flat Creek	:	4,120	: 25.5	: .058+	: .23	: 239
Bennett Creek	:	580	: 36.0	: 0	: .	: 0
Brett-Miner	:	1,550	: 7.9	: .077+	: .96	: 119
Rock City	:	1,600	: 16.0	: .040+	: .25	: 64
Hawksite	:	8,780	: 16.1	: .033+	: .20	: 290
Cabin Creek	:	7,000	: 20.2	: .089+	: .44	: 623
	:		:	:	:	
Total	:	39,590	: 25.8	: .152	: .58	: 6,035

Table I (Cont.)

Unit	Forks District				Percent of stand killed	Infested trees
	Acres	Green stand	Attacks per acre			
Big Elk	4,960	11.2	.063+		.56	312
Potter	3,800	23.5	.058-		.25	220
Stewart	2,200	16.1	.103+		.63	227
Upper Flat Creek	3,680	14.4	.022-		.15	81
Total	14,640	15.8	.057		.36	840
Forest total	113,910	20.2	.121		.59	13,793

To depict the yearly trend of the infestation the following table of infested trees per acre for each unit is given. Infestation figures marked (*) indicate that control measures were instituted against that particular infestation. While the control measures were sometimes conducted during the fall of the same year as the infestation, they more often took place during the following spring. The enclosed map will give the location and relative size of the units.

Table II
ANNUAL INFESTATION PER ACRE ON THE COEUR D'ALENE FOREST

Unit	: Acres	Infested Trees per Acre						
		: 1930	: 1931	: 1932	: 1933	: 1934	: 1935	: 1936
Little River District								
Forks	: 1,100	: .110*	: .206*	: .154	: .099	: .338	: .277	: .026 : .039
Tom Lavin	: 3,000	: .090*	: .090*	: .101	: .095	: .133	: .058	: .061 : .020
Iron Creek	: 4,120	: .050	: .019	: .102	: .164	: .337	: .328	: .042 : .041
Cathcart	: 3,200	: .063	: .045	: .237*	: .058	: .109	: .050	: .023 : .020
Cascade	: 3,640	: .078*	: .083	: .092	: .352*	: .167	: .201	: .100 : .124
Picnic	: 1,680	: .120	: .064	: .091	: .111	: .286	: .089	: .067 : .033
Honeysuckle	: 5,320	: .046	: .057	: .160*	: .082	: .221*	: .175	: .116 : .177
Leiberg	: 4,440	: .054	: .207*	: .101	: .020	: .176	: .114	: .014 : .016
Laverne	: 2,560	: .052	: .085	: .123*	: .046	: .110	: .146	: .077 : .045
Copper Creek	: 4,000	: .054	: .156	: .105	: .103	: .099	: .144	: 0 : .079
Total	: 33,060	: .060	: .091	: .132	: .121	: .158	: .159	: .054 : .069
Grizzly Mountain District								
Taylors	: 2,800	: .045	: .126*	: .054	: .288	: .159	: .135	: .017 : .272*
Forks-Cabin	: 5,440	: .069*	: .041	: .131*	: .278	: .233	: .224	: .029 : .234*
Can Creek	: 1,760	: .304*	: .159*	: .087	: .055	: .118	: .200	: .015 : .156
West Fork	: 3,960	: .045	: .042	: .103	: .176	: .099	: .098	: .037 : .118
Clay Creek	: 2,320	: .061*	: .054	: .167*	: .246	: .240	: .271	: .059 : .240*
Lower Cougar	: 3,600	: .059*	: .121*	: .150*	: .189	: .125	: .176	: .033 : .100
Upper Cougar	: 3,700	: .038*	: .053	: .141*	: .115	: .032	: .120	: .038 : .091
Bumblebee	: 3,040	: .063*	: .166*	: .030	: .152	: .117	: .146	: .019 : .195
Total	: 26,620	: .073	: .083	: .109	: .197	: .142	: .168	: .032 : .174

Table II (Cont.)

Unit	Acres	Infested trees per Acre							1936	1937
		1930	1931	1932	1933	1934	1935	1936		
Shoshone District										
Sissions	4,700	.275*	.182*	.122	.256	.310*	.306	.099	.221	
Yellow Dog River	2,140	.161*	.467*	.584*	.385	.431*	.500	.233	.557*	
Yellow Dog Creek	4,120	.135*	.069*	.133*	.075	.193*	.139	.129	.166	
Downey	4,160	.244*	.167*	.154*	.199	.294*	.383	.078	.391*	
N. Yellow Dog	840	Y.D.R.*	.229*	.360*	.375	.234*	.800	.034	.112	
Lower Flat Creek	4,120	.126*	.080*	.221*	.224	.174*	.026	.023	.058	
Bennett Creek	580		.028*	.161*	.500	.255*	.214	.037	0	
Brett-Miner	1,550	.026	.133*	.109*	.125	.161*	.200	.010	.077	
Rock City	1,600	.104*	.016	.031*	.300	.121*	.067	.013	.040	
Hawksite	8,780	.098*	.139*	.035	.120	.093	.095	.024	.033	
Cabin Creek	7,000	.088*	.067	.021	.130	.233*	.223	.048	.089	
Total	39,590	.129	.125	.125	.169	.201	.212	.064	.152	
Forks District										
Big Elk	4,960	.038	0	.081	.171	.348	.184	.062	.063	
Potter Creek	3,800	.096*	.091	.082	.184	.727	.329*	.100	.058	
Stewart	2,200	.151*	.125	.111	.063	.352	.073	.023	.103	
Upper Flat Creek	3,680	.041	.044	.041	.041	.096	.134	.034	.022	
Total	14,640	.073	.054	.076	.125	.383	.192	.059	.057	
Forest total	113,910	.087	.098	.118	.157	.207	.164	.053	.121	

Data available from surveys and control projects indicate that there was an infestation of approximately .3 infested tree per acre on the forest in 1929. Following an extensive control project against this infestation, there was a sharp decrease to .087 in 1930. In the following years there was a steady increase until the infestation reached .207 in 1934. During that time control measures were conducted on a number of areas against highly potential infestations. It was felt that the peak of the outbreak had been reached in 1934, and control measures thereafter were confined to those areas where the infestation was considered a source of potential increase. As expected, the infestation as a whole decreased during the following year, and the only control measures undertaken were in the nature of experimental tree medication in Potter Creek. A further decrease occurred throughout the forest in 1936 when the infestation in a number of units decreased to what was thought to be a normal level.

The 1937 infestation has increased 128 percent over that of 1936. Although this increase is actual in number of trees destroyed, it is believed that the insect population has not changed materially from that of 1936. Infestation studies conducted on this forest during the past two years indicate that the emerging brood of 1937 attacked smaller trees and with fewer attacks per square foot. While the attacks in 1936 averaged approximately three per square foot, the 1937 attacks averaged approximately 1.8. This means that the infestation has spread out thinly over a larger number of trees.

Table III presents a forest summary of all the data secured from

surveys and control projects since the survey of Steamboat Creek in 1928. During the first three years of 1928-1930 no data were taken as to the percentage of the infestation occurring in windfalls. At that time infested windfalls were seldom encountered and were only a minor factor in relation to the infestation. During the succeeding years an increasing amount of down timber occurred, and data relative to the percentage of the infestation occurring in this non-resistant host material were taken. However, the 1937 infestation is nearly all in standing timber, and the infestation of down timber is again only of a minor quantity.

Table III
COEUR D'ALENE FOREST SUMMARY OF THE
ANNUAL INSECT INFESTATION SURVEY 1937

	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
Acres surveyed*	9,000	99,540	107,630	127,550	127,430	124,320	118,410	113,910	113,910	113,910
New attacks per acre	.278	.300	.087	.098	.115	.157	.207	.184	.053	.121
Percent of increase	No data	No comparison	-71	+13	+20	+33	+32	-11	-71	+128
Percent windfalls	No data	No data	No data	56	50	51	47	16	21	4.7
Infested trees	2,500	29,881	9,371	12,496	14,457	19,520	24,466	20,952	6,058	13,793
Acres recommended for control	9,000	99,540	61,770	52,120	32,940	3,200	23,680	None	None	3,605
Trees estimated for treatment	2,500	25,904	6,801	8,717	6,757	1,281	6,725	None	None	3,313
Year in which control was conducted	1929	1930	1931	1932	1933	Fall	1935			1937 Fall
Acres treated	5,620	73,210	39,180	40,666	27,204	3,622	9,213			3,243
Treated trees	1,074	22,926	7,106	7,906	6,434	877	2,834	283 Med.	156 Med.	4,001

c.l. - Cull logs (2 c.l.--1 tree for comparison)

Med. - Treated by experimental medication

* The surveyed acreage shows a variation, because in some instances new areas were found to be infested and were added; other areas were logged off or burned over and therefore dropped.

In the following pages the units will be given separately, as there are various factors that are peculiar to each area.

LITTLE RIVER DISTRICT

			Forks Unit	
Attacks per acre		:Percent of stand killed :	Infested trees	
1935 : 1936 : 1937	:	1937	:	1937
.277	.026	.039	.55	43

Logging operations have reduced the stand in this unit from 24 green trees per acre prior to 1936 to 7 trees per acre at present. The logging operations were no doubt a big factor in reducing the infestation in the unit. A number of newly attacked logs that were being taken out were seen in 1936.

			Tom Lavin Unit	
Attacks per acre		:Percent of stand killed:	Infested trees	
1935 : 1936 : 1937	:	1937	:	1937
.058	.061	.020	.28	60

Logging operations reduced the WP stands to 7 trees per acre in 1935. A marked reduction in the infestation followed.

			Iron Creek Unit	
Attacks per acre		:Percent of stand killed:	Infested trees	
1935 : 1936 : 1937	:	1937	:	1937
.328	.042	.041	.32	168

The infestation in this unit reached its peak in 1934 and 1935. At that time a decrease was predicted which took place during 1936.

Logging operations in progress during the summer will no doubt further reduce the infestation which is somewhat concentrated along the stream bottoms.

Cathcart Unit					
Attacks per acre		:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937	:	1937	:	1937	
.050	.023	.020	.21		64

The infestation has been very light in this unit during the past two years.

Cascade Unit					
Attacks per acre		:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937	:	1937	:	1937	
.201	.100	.124	.75		451

There has been no material change in the infestation in the Cascade drainage. The infested trees are somewhat grouped and occur in the heavier stands near the bottom of the drainages. During the 1936 survey 41 percent of the infested trees were recorded as being infected with a root fungus. A similar condition was found in 1937 when 48 percent of the infested trees were found to be infected.

Picnic Creek Unit					
Attacks per acre		:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937	:	1937	:	1937	
.089	.067	.033	.53		55

The stands in Picnic Creek are lightly stocked, as the drainage has been logged in recent years. As the remaining stands are mostly on a southern exposure, they have been weakened to some extent by

exposure caused by the opening up of the stand. The attacks are nearly all confined to such weakened, dry-sided trees.

Honeysuckle Unit

Attacks per acre	:Percent of stand killed:	Infested trees		
1935 : 1936: 1937	:	1937	:	1937
.175 .116 .177	.90	942		

Control measures were last conducted on the Honeysuckle unit against the 1934 infestation which was .221 infested trees per acre. Although the infestation decreased during the fall, it has increased to some extent this year. The attack is lighter, however, and it is felt that the actual infestation remained about the same. Root fungus is very prevalent in this area. Of 254 green trees examined, 5 percent were found to be insect-infested. The insect-infested trees were found to be 20 percent infected with root fungus, which seems to indicate that the insects have a preference for fungus-infected trees. Wow!

Leiberg Unit

Attacks per acre	:Percent of stand killed:	Infested trees		
1935 : 1936 : 1937	:	1937	:	1937
.114 .014 .016	.16	71		

The Leiberg unit has been logged and is but lightly stocked with seed trees. The infestation in the past, except for 1935, has been largely in windfalls. The present infestation is only normal for such areas, and there is no evidence of a serious increase.

Laverne Unit					
Attacks per acre		:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937	:	1937	:	1937	
.146	.077	.045	.24	115	

The stands in Laverne Creek consist of a very heavy stocking of white pine along the creek bottoms. The infestation has shown rather wide annual fluctuations in the past, which is hard to explain. At times there is excessive flooding from beaver dams, which may weaken the creek-bottom trees sufficiently to permit the build-up of an annual increase in them and which may spread to adjacent stands.

Copper Creek					
Attacks per acre		:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937	:	1937	:	1937	
.144	0	.079			

While no infested trees were recorded during the 1936 survey, a light infestation no doubt existed. Intermittent logging in the drainage for the past several years is thought to have played an important part in holding the infestation to an endemic status.

In briefly summarizing the Little River district--there are only two areas where the infestation is over .1 infested tree per acre (Cascade and Honeysuckle). Neither of these areas shows a very marked increase over the infestation of 1936, and in both instances the infestation is lower than in 1934 and 1935. While the present upward trend in infested trees per acre means the destruction of nearly one percent of the stand, which is a serious annual loss, the attacks are lighter than in 1936 and the trees attacked are somewhat smaller.

GRIZZLY MOUNTAIN DISTRICT

			Taylor's Unit	
Attacks per acre		:Percent of stand killed:	Infested trees	
1935 : 1936 : 1937	:	1937	:	1937
.135	.017	.272	2.47	762

A relatively serious outbreak has built up in the Taylor's area from what was apparently a subnormal infestation in 1936. The estimated number of infested trees is low, as control measures conducted in the fall of 1937 on a small area of concentrated infestation found more trees than estimated. This is partially due to late summer attacks occurring after the survey and partially to a poor selection of strips. In former years the survey strips averaged 16 green trees per acre for the unit, while in 1937 they averaged but 11.

There were two areas on the Taylor's unit where heavy concentration of attacks occurred-- the larger area, estimated at 725 acres with 529 infested trees, and a small area on a ridge north of Omaha Creek where about 10 percent of the stand was attacked on about 30 acres. The infested trees were treated in the fall of 1937.

			Forks-Cabin Unit	
Attacks per acre		:Percent of stand killed:	Infested trees	
1935 : 1936 : 1937	:	1937	:	1937
.200	.018	.156	.69	1,273

A very heavy concentration of infestation was found in parts of Sections 15, 16, 21, 22, which includes parts of the Clay Creek and Forks-Cabin units which contain some of the heaviest white pine stands of Steamboat Creek. Control measures were recommended for the

unit showed an increase, it is still comparatively light. The timber stands of Flat Creek except for a small area are not the type that are apt to suffer severe epidemic losses. While a small area on the south side of the creek about one mile above the mouth is covered with a comparatively young, heavily stocked white pine stand, the larger part of the unit is covered with a mature white pine-hemlock type. It seems that in the younger, 140-160 age class, where the stand runs up to 40 or 50 white pine per acre, epidemic infestations are apt to occur in large groups, while in the older more thinly stocked stands of large trees, single attacks or groups up to three infested trees are more often found. In former control projects large groups of infested trees have been treated in the smaller area mentioned, while more than one or two infested trees to a place have seldom been spotted in the remaining area.

Bennett Creek Unit					
Attacks per acre	1935	Percent of stand killed:	1936	Infested trees	1937
.214	.037	0	--	--	--

The Bennett Creek unit is a small area of 580 acres north and adjacent to Flat Creek. A large blow-down occurred in the area about 1930. Hundreds of down trees became infested which were later treated. The infestation reached its peak in 1933 when .5 tree per acre was infested. Because the 1933 infestation was in lightly attacked windfalls and other non-resistant material, no control was instituted. During the following year the infestation concentrated into fewer heavily

attacked trees which were treated. Although nearly as many trees were attacked during the following year, the infestation per tree was much lighter. The infestation then decreased through natural controlling factors in 1936 to .037 infested tree per acre. Although no infested trees were recorded in 1937, a very light infestation no doubt exists.

Miner Creek Unit

Attacks per acre	:Percent of stand killed:	Infested trees
1935 : 1936 : 1937	:	1937
.2 .01 .077	.96	119

The infestation in Miner Creek, which is apparently increasing, is thought to be showing only a temporary fluctuation as in 1935.

Rock City Unit

Attacks per acre	:Percent of stand killed:	Infested trees
1935 : 1936 : 1937	:	1937
.067 .013 .04	.25	64

Only a minor infestation of lightly attacked trees was recorded on the Rock City unit. Although there has been an increase in infested trees per acre, it is believed that the insect population is much the same as in 1936.

Hawksite Unit

Attacks per acre	:Percent of stand killed:	Infested trees
1935 : 1936 : 1937	:	1937
.095 .024 .033	.2	290

Only a light infestation has been recorded on this unit during the past two years.

Cabin Creek Unit					
Attacks per acre		:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937	:	1937	:	1937	
.233	.048	.089	.44	623	

The infestation in the Cabin Creek unit is much the same as in 1936. The stands are younger and more heavily stocked than in the adjacent Hawksite unit. Root fungi are also more prevalent, as nearly five percent of the green stand was recorded as being infected.

All units in the Shoshone district except one increased in infested trees per acre during 1937. Although this has destroyed more timber than in 1936, the number of attacks per square foot are much lower than in 1936 and the actual insect population is thought to be nearly the same.

FORK DISTRICT

Big Elk Creek Unit					
Attacks per acre		:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937	:	1937	:	1937	
.184	.062	.063	.56	312	

The infestation in Big Elk Creek is virtually unchanged from that of 1936. The stands are lightly stocked with mature timber a high percentage of which is infected with root fungus.

Potter Creek Unit					
Attacks per acre		:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937	:	1937	:	1937	
.329	.1	.058	.25	220	

The infestation in this unit has been decreasing during the

past four years from a high point of .727 infested tree per acre, and these trees were nearly all infested windfalls. Experimental control measures were applied to 253 infested trees during the fall of 1935. Although the experimental control measures were no doubt a contributing factor, it is felt that natural controlling agents were responsible for the decrease of 1936.

Stewart Creek Unit				
Attacks per acre	:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937	:	1937	:	1937
.073 .023 .103		.63		227

The increase in this unit is thought to be in the nature of a minor fluctuation. Past records show that the infestation has increased to .352 infested tree per acre in 1934, which was followed by a substantial decrease in the following year.

Upper Flat Creek Unit				
Attacks per acre	:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937	:	1937	:	1937
.134 .034 .022		.15		61

Aside from a minor fluctuation in 1934 and 1935, the infestation in this unit has been very low since control measures were instituted against an infestation of .205 infested tree per acre in 1929. The present infestation is thought to be a normal one.

CONCLUSIONS

The infestation on the forest as a whole showed an alarming increase in infested trees per acre during 1937, which is due to two

factors: fewer attacks on a greater number of trees, and a heavy late summer emergence of parent adult and 1937 brood. It is hard to predict the trend of the present infestation, although it is felt that the attacks per tree will no doubt increase, which should cause a corresponding decrease in the infestation.

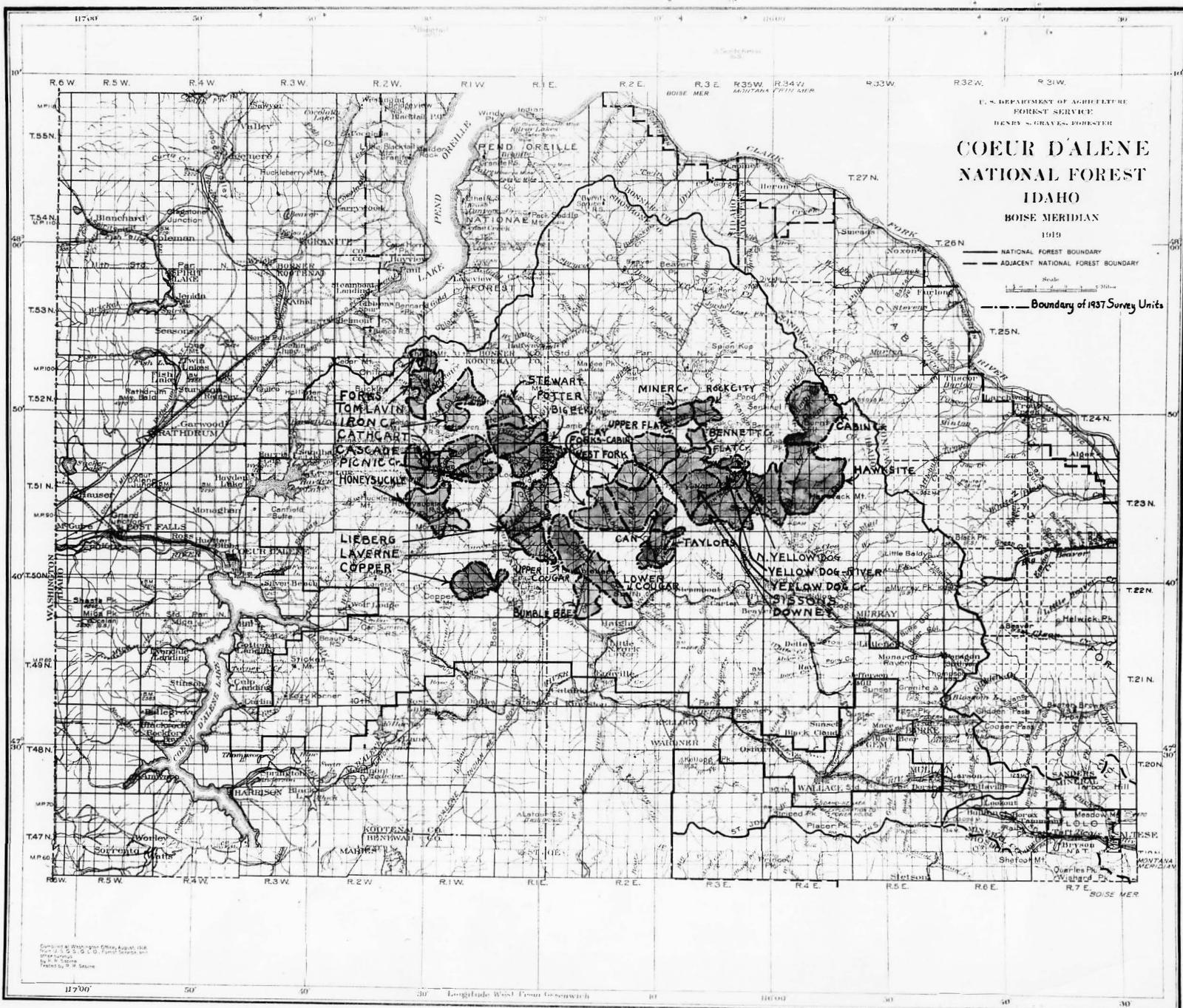
Defoliation

Defoliation of Alpine type areas by a species of looper occurred throughout northern Idaho during the summer of 1936.

Several areas of Alpine type on the Coeur d'Alene Forest were defoliated to a serious degree. One of the largest of these defoliated areas occurred on the southwest slope of Jackknife Peak. Practically 100 percent defoliation of white and Alpine fir was recorded on an area of about 360 acres, while defoliation to a lighter extent occurred over a larger area. Other areas of serious defoliation were recorded on the Honeysuckle Summit and south of Spyglass Mountain. A separate report is being submitted on this infestation.

Respectfully submitted,

T. T. Terrell
Scientific Aide



COST ANALYSIS OF THE 1937 SURVEY

Transportation	\$120.56
Subsistence	399.76
Wages	1,427.80
Miscellaneous and Equipment	35.85
Terrell's Salary - 1 month	<u>175.00</u>
Total Field Cost	\$2,158.97
Effective Mandays	159
Noneffective Mandays:	
26 - Cook; 18 - training; 15 camp & travel;	
51 - Sundays & holidays; 23 rain	135
Supervision	<u>50</u>
Total Mandays	374
Miles of Sample Strip	713.5
Miles of Sample Strip per Effective Manday	3.77

SUMMARY

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James C. Evenden

A rather peculiar variation in the severity of the mountain pine beetle infestation in white pine is described in Mr. Terrell's report of the 1937 insect survey of the Coeur d'Alene National Forest. In five of the survey units, namely, Taylor's Forks-Cabin, Clay Creek, Yellow Dog River, and Downey Creek, limited areas of severe infestations were recorded. Though in some of the other thirty-two units of the forest there were slight increases in the severity of the infestation, none of these situations were considered as alarming. It is difficult to explain the occurrence of the severe rather localized outbreaks within the five units mentioned, for with the exception of the Yellow Dog unit conditions recorded by the 1936 survey were no different than those encountered in many other areas. Obviously environmental conditions were favorable for the development of these outbreaks, and undoubtedly tangible factors were present at that time which would have indicated subsequent 1937 conditions had one been able to recognize and evaluate them. The ability to foresee conditions which will indicate the subsequent status of an infestation in advance of actual physical changes is the objective sought in the present study of mountain pine beetle infestations in white pine which was instituted in 1936. The value of such early predictions as a means of reducing the cost of control, as well as eliminating excessive timber losses, is obvious.

A rather definite conclusion as to the development of localized

centers of infestation can be drawn from the 1937 survey data. Though a positive relation between such centers of infestation and subsequent conditions within adjacent areas is difficult to establish, one no longer questions the potential spread of such outbreaks. As the severe infestation on these five areas threatened not only the timber stands of the units but of the entire forest as well, it was recommended that control measures be instituted for the treatment of all infested trees within specified boundaries. These recommendations were approved and control measures instituted during October. Camps were located and crews hired for the execution of the work at the Taylors and Forks Cabin-Clay Creek areas in the Steamboat Creek drainage. Spotting crews were employed for the Yellow Dog and Downey Creek units, with CCC enrollees being used for the treatment of trees. With the exception of the Forks Cabin-Clay Creek unit, where unfavorable weather conditions forced the cessation of the project prior to completing the work, all infested trees have been treated. In this one area 247 logged trees were left untreated and there are some additional areas to be spotted which are estimated to contain 250 additional trees. A sketch map of this area is attached to these comments.

As Mr. Terrell stated in his report, the estimates submitted as to the number of infested trees on these five units proved to be much lower than the number actually spotted. Though discrepancies often occur between estimates based upon extensive survey data and actual spotting records, the variations in these instances were of a magnitude as to require some explanation. This error obviously resulted

treatment of an estimated 1,008 infested trees on 960 acres in the heaviest part of the infestation. During the course of the control project 1,196 infested trees were spotted on 769 acres. While this is considerably higher than the estimate, about 20 percent of the infested trees are believed to have been attacked after the survey was completed. The timber stand outside the areas of concentration were rather lightly infested, although some increase may have occurred through fall emergence after the survey was finished. It is doubtful, however, that as heavy an emergence occurred in the adjacent stands as in the area of concentration.

A large number of trees have been killed by root fungus infection in parts of the unit during the past eight years. While root fungi were recorded in three percent of the green stand during 1937, it is less noticeable than in the past.

Can Creek Unit				
Attacks per acre	Percent of stand killed:		Infested Trees	
1935 : 1936 : 1937	:	1937	:	1937
.2	.018	.156	.56	275

The stands in Can Creek are decadent to some extent, as over 12 percent of the green trees were recorded as being infected with root fungus. There have been rather wide fluctuations in the infestation for the past eight years that are hard to account for.

West Fork Unit				
Attacks per acre	Percent of stand killed:		Infested trees	
1935 : 1936 : 1937	:	1937	:	1937
.098	.037	.115	.66	467

The infestation in the West Fork unit is now in about the same status as in 1933 to 1935. Though practically all of the 1936 infestation occurred in broken-topped and windfall trees, the 1937 infestation is only 20 percent windfalls. Root fungus is very prevalent, as 15 percent of the infested trees were found to be infected.

Clay Creek Unit

Attacks per acre	: Percent of stand killed:	Infested trees
1935 : 1936 : 1937	:	1937
.271 .059 .240	.60	557

Part of concentrated infestation treated during the fall of 1937 was in the lower part of Clay Creek. The infestation throughout the unit is of much the same character as that of the Forks-Cabin unit. The area has suffered to a very serious extent from broken-topped trees which were infested in 1936. Root fungus is also prevalent on the unit, as 13 percent of the green stand was recorded as being infected with it. Nearly 40 percent of all the insect-infested trees also showed evidence of root fungus infection. The stands in the area are heavily stocked with white pine as are those in the Forks-Cabin unit.

Lower Cougar Unit

Attacks per acre	: Percent of stand killed:	Infested trees
1935 : 1936 : 1937	:	1937
.176 .033 .100	.40	360

The infestation in the Lower Cougar Creek drainage is largely confined to late summer attacks. Broods in eighty percent of the infested trees recorded on the sample strips were in the egg and small larval stage. No root fungus was found either in the green stand or in the infested trees.

			Upper Cougar Unit	
Attacks per acre	:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937 :	1937	:	1937	
.120 .035 .091	.42		337	

The infestation in the Upper Cougar unit has proved very variable in the past few years, fluctuating from above .1 to .03+ on alternate years.

			Bumblebee Unit	
Attacks per acre	:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937 :	1937	:	1937	
.146 .019 .198	2.5		602	

The white pine stands of the Bumblebee area have been logged in recent years. The remaining stand is but eight trees per acre, which accounts for the large percentage of the stand being killed with an infestation of .198 infested tree per acre. The infestation has been above .1 since 1933, with the exception of 1936 when it was recorded as .019. In the 1937 infestation the attacks are relatively heavy and seem about equally divided between early and late attacks. The infested trees are somewhat grouped and occur throughout the area with no apparent concentration.

To summarize the Grizzly Mountain district--all the units show marked increases in infested trees per acre, which is believed to be due largely to a heavy reemergence and attack during late August and September. A large percentage of the infested trees contained only eggs and small larvae at the time of the survey, and many trees were being attacked at that time. Control measures have already been recommended and applied to the three most heavily infested areas and should

be effective in preventing severe losses from occurring in 1936.

SHOSHONE DISTRICT

			Sisson's Unit	
Attacks per acre	:Percent of stand killed:	Infested trees		
1935 : 1936 : 1937	:	1937	:	1937
.306	.099	.221	.89	1,039

During the past eight years a total of nearly two white pine trees per acre have been killed on the Sisson's unit. The infestation per acre has never reached as high a figure as in some of the other units, but it has maintained a generally high level. Control measures have been instituted against the infestation during three different seasons without materially reducing the number of infested trees per acre. The white pine stands throughout the area have the appearance of low vigor. In many large spots the foliage is distinctly faded, causing yellowish bands across some of the side hills. The trees seem to have practically no resistance to insect attacks, for many trees were seen where a very few insects were apparently constructing galleries without the resistance of pitch flow. The infestation per tree seldom extends above the first log in height and quite often is on only the lower portion of the bole. Root fungus infection is present, but not to the extent that it is in some of the more heavily infected units. It is doubtful if control measures would be of permanent value in reducing the infestation with stand conditions as they are.

Yellow Dog River Unit				
Attacks per acre	:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937 :	1937	:	1937	
.5 .233 .587	2.6		1,256	

Control measures were recommended for the Yellow Dog River unit and they were applied during the fall of 1937. While there were no particular concentrations of infestation, the stand throughout the area was badly infested. The attacks per tree were light and the infested length of the bole was rather short, however, inasmuch as the infestation had reached a stage where over .5 of a tree per acre was infested, it was deemed necessary to protect the remaining stand. Although root fungus infection is very prevalent throughout the area, many trees are dying from some cause that was not revealed through examination.

Yellow Dog Creek Unit				
Attacks per acre	:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937 :	1937	:	1937	
.139 .129 .166	.47		684	

The infestation in this unit has not changed materially from that of 1936. The stands seem to be in much better condition than those in the adjacent Yellow Dog River and Downey units.

Downey Unit				
Attacks per acre	:Percent of stand killed:		Infested trees	
1935 : 1936 : 1937 :	1937	:	1937	
.383 .079 .391	.93		1,627	

An area of severe infestation occurred within the Downey unit on an area estimated to contain 960 acres. Sample strips indicated one infested tree per acre in the heavily infested area, while but .14 infested tree was estimated on the remaining portion of the unit. Control measures were instituted in the area in conjunction with the Yellow Dog River unit. A total of 1,494 acres were spotted and 2,600 infested trees were marked for treatment.

North Yellow Dog Unit				
Attacks per acre	:Percent of stand killed:	Infested trees		
1935 : 1936 : 1937 :	1937	:	1937	
.8 .034 .112	.33		94	

The North Yellow Dog unit is a somewhat isolated area of 840 acres near the Yellow Dog River and Downey units. The stands, however, are apparently more vigorous and healthy than in the adjacent areas. The infestation reached its peak in 1935, and because of the general condition of the brood and the abundance of parasites it was felt that a decrease would follow through natural controlling factors, and no artificial control was instituted. A very marked decrease did occur during the following year. An increase occurred in 1937, but did not approach the infestation level of former years.

Lower Flat Creek Unit				
Attacks per acre	:Percent of stand killed:	Infested trees		
1935 : 1936 : 1937 :	1937	:	1937	
.026 .023 .058	.23		239	

Although the 1937 insect infestation in the Lower Flat Creek

in underestimating the size of the areas of concentrated infestation and from the large number of late attacks which occurred subsequent to the survey. These late attacks resulted from a partial emergence of June attacks. This instance is the first record available where this partial emergence has been of such importance as to seriously influence the data secured from previous surveys.

An opportunity is taken in these comments to mention the character of the entomological phases of the control work as conducted last fall. The fact that well-trained, experienced camp managers, crew foremen, and chief spotters were secured for all areas, who were conscientious in their efforts to perform thorough work, explains the excellent spotting and treating which followed. Though some unnecessary peeling may have occurred, no untreated infested bark surface was recorded by officers of this laboratory, who spent considerable time on the different projects. J. A. Kedzior, 1937 graduate of Syracuse University, New York, who had been employed by the Forest Insect Laboratory during the summer, was assigned to this project as a check spotter. The efficiency of the spotting at the different camps as depicted by Mr. Kedzior's data is shown in the following tabulation.

Total area	Total area	Percent	Number tagged	Number trees	Percent	
spotted	: checked	: checked	: trees counted	: missed	: efficiency	
Upper Steamboat -- Forks Cabin-Clay Creek Units						
769.4 A	: 247.5	: 32.1	: 745	: 6	: 99.21	
Lower Steamboat -- Taylor's Camp						
980 A	: 123.7	: 12.6	: 209	: 8	: 96.4	
Yellow Dog-Downey Unit						
1,920 A	: 349.9	: 18.2	: 779	: 14	: 95.3	

These data would seem to indicate that this phase of bark-beetle control can be made nearly 100 percent efficient. It is believed that check spotting contributes to a higher efficiency.

RECOMMENDATIONS

It is regretted that all infested trees within the Taylor-Cabin-Clay Creek unit could not have been treated last fall. Sufficient infestation still remains within this area to constitute a serious menace to residual and adjacent white pine stands, and its treatment in the spring of 1938 is recommended. It is estimated that there are 500 trees on some 400 acres, 247 of which are already marked. Though it is realized that camp establishment and transportation in early spring are often more difficult and expensive than fall operations, it is believed these trees can be treated at the same rate (\$5.00) as during last season's project. This will require an expenditure of \$2500.

In addition to the areas on which control measures were instituted

there are fairly heavy infestations on the Cascade and Honeysuckle units of the Little North Fork district which may develop into more serious situations. In many of the other units there have been slight increases in the number of infested trees, which may be considered as a fluctuation of normal conditions or as indicating further increases in 1938. It is difficult to predict what the 1938 infestation will be, though the survey should be repeated during the coming season for the purpose of locating any alarming situations.

Respectfully submitted,

James C. Evenden
Sr. Entomologist

UNITED STATES DEPARTMENT OF AGRICULTURE—FOREST SERVICE

Land district. Mag. declin.

22° 30'

Area

acres

T. 51N.

R. 2E

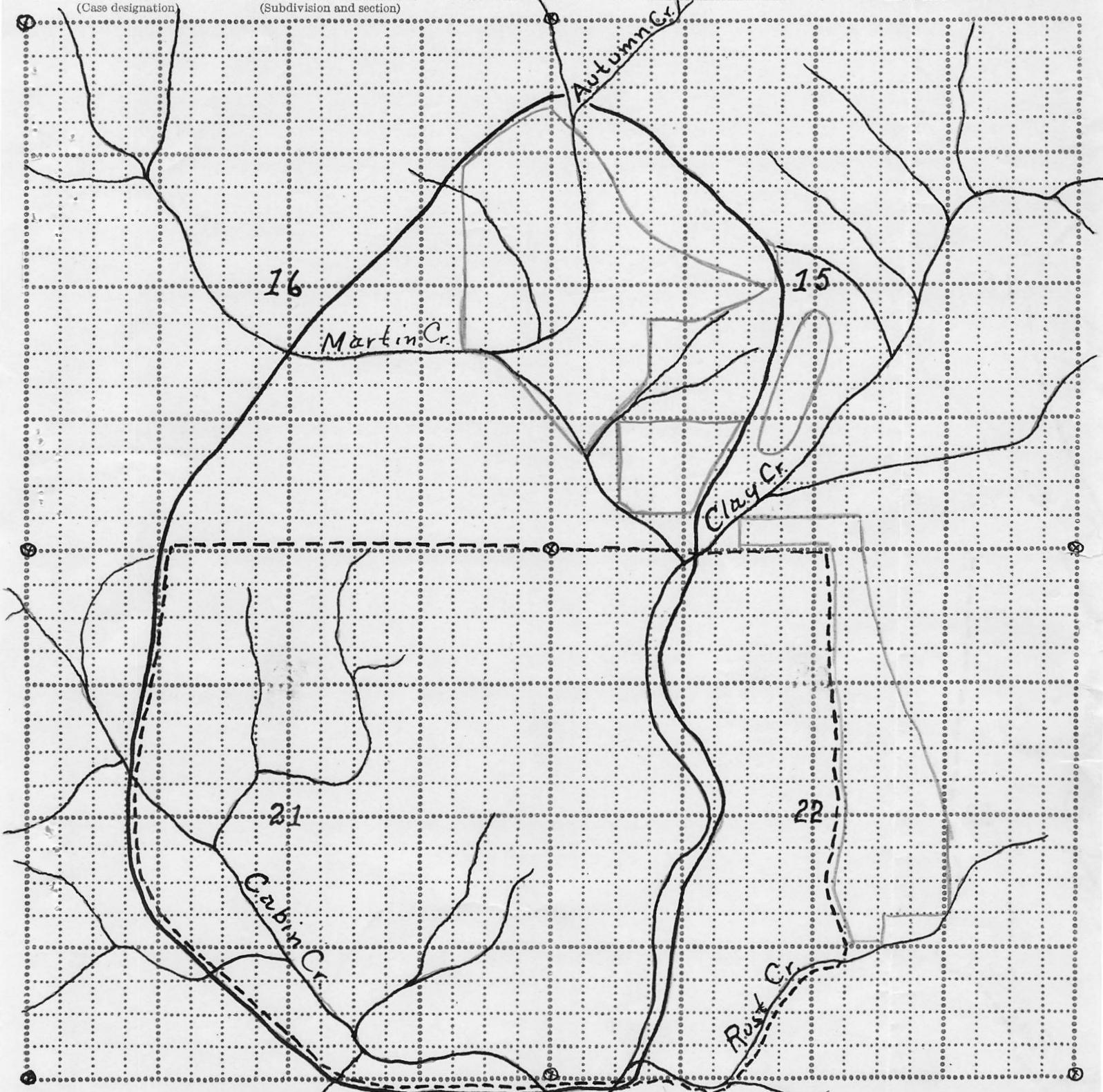
Mer. Scale

4

inches = 1 mile

(Case designation)

(Subdivision and section)



Field work by

Date

Platted by

Remarks — Original area set up for control — Area treated, exception 247 trees.
along east boundary. — Areas to be spotted (250 trees).

Approved

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